CLASS: M.TECH.   SEMESTER : I
BRANCH: EEE   SESSION : MO/2023

SUBJECT: EE571 SOFT COMPUTING TECHNIQUES IN ELECTRICAL ENGINEERING
TIME: 3 Hours   FULL MARKS: 50

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	Explain the significance of soft computing in electrical engineering and describe the main components of soft computing.	[5]	1	5
Q.1(b)	Explain the problem of optimization and differentiate between single-objective and multi-objective optimization. Explain the significance of evolutionary algorithms in solving optimization problems.	[5]	1	5
Q.2(a)	Explain the model and benefits of ANN. Describe the various types of ANN.	[5]	2	5
Q.2(b)	Formulate the synaptic-weight update equation for training an ANN using the back-propagation algorithm.	[5]	2	6
Q.3(a)	Develop a MATLAB code for estimating the union, difference and complement of fuzzy sets. Input the fuzzy sets from the user.	[5]	3	1
Q.3(b)	Three fuzzy sets are defined as:	[5]	3	3

Q.3(b) Three fuzzy sets are defined as:
A= {0.3/30 + 0.7/60 + 1.0/100 + 0.2/120}
B= {0.2/20 + 0.4/40 + 0.6/60 + 0.8/80 + 1.0/100 + 0.1/120}
C= {0.33/500 + 0.67/1000 + 1.0/1500 + 0.15/1800}
Calculate the following relations:
   (i) $R = A \times B$
   (ii) $S = B \times C$
   (iii) $T = R \circ S$ using max-min composition

Q.4(a)	Explain the importance of defuzzification and elaborate on any three defuzzification methods commonly used in decision-making.	[5]	4	5
Q.4(b)	Develop a strategy to control a second-order system using a fuzzy logic controller. Also, specify the required inputs and outputs of the controller, the number of membership functions, and the choice of the membership functions. Formulate a table for the sample rule base.	[5]	4	6
Q.5(a)	Apply the GA-Fuzzy approach to solve the optimal power flow (OPF) problem.	[5]	5	3
Q.5(b)	Develop a strategy for load forecasting using artificial neural network (ANN).	[5]	5	6